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ABSTRACT

This study was aimed at extending previous correlational findings on the motivational components of test performance, studied among seventh graders by Pintrich and De Groot, to college students and to sequential task performance, including a voluntarily performed task. Performance was also examined under different experimental conditions of incentive value. A total of 125 junior and senior class college students preparing to become teachers participated in the study's two parts. In the correlational part, a factor structure somewhat similar to that of Pintrich and De Groot was found with a self or attitude factor (reflecting different measures of self-efficacy), an ability/achievement or intellectual factor (reflecting test score performance), and an incentive or emotional factor (reflecting the value of choosing to perform). In the experimental part, incentive value was also found to relate to voluntary or self-motivated performance. The greater importance of incentive value as a motivator in this study, in comparison to the earlier study of seventh graders, was surmised to be a function of the importance of grades in the college setting. Contains 13 references. (GLR)

Motivational Components of College Students' Performance and Productivity

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ABSTRACT

This study was aimed at extending previous correlational findings on the motivational components of test performance by Pintrich and De Groot (1990) to college students, tested sequentially, and including a voluntarily performed task. Performance was also examined under different experimental conditions of incentive value. In the correlational part, a factor structure somewhat similar to that of Pintrich and De Groot was found with a self or attitude factor (reflecting different measures of self-efficacy), an ability/achievement or intellectual factor (reflecting test score performance), and an incentive or emotional factor (reflecting the value of choosing to perform). In the experimental part, incentive value was also found to relate to voluntary or self-motivated performance. The greater importance of incentive value as a motivator in this study, in comparison to the previous study, was surmised to be a function of the importance of grades in the college setting.

The exercise of influence over one's own behavior has been termed self- regulation. It can be clearly seen in the ways people deal with addictions to substances such as drugs, cigarettes, and food (Bandura, 1982). The inclination to self-regulate can be regarded as a manifestation of motivation, and so the analysis of this inclination can help extend our understanding of the components of motivation.

The concept of self-regulation can be applied not only to the elimination of behaviors, such as addictive ones, but to the accomplishment of behaviors as well. Doing this has extended the application of the concept to the field of education, and given rise to the notion of self-regulated learning as reflected in academic performance (Corno and Mandinach, 1983). Hence, we would say that the performance of students on an academic task, in addition to being a reflection of their knowledge or intellectual capabilities, is also a reflection of their motivation. Moreover, as the knowledge or intellectual demands of an academic task are reduced, the contribution made by motivation to its performance is increased. Tuckman and Sexton (1991) have referred to performance on such tasks as self-regulated performance, and regard them as an excellent vehicle for the study of motivation.

Pintrich (1988, 1989) has proposed that the motivation required for self-regulation is made up of three components: (1) an expectancy component, corresponding to what Bandura (1977) called self-efficacy or one's belief in one's capability to satisfactorily execute the required performance; (2) a value component, related to what is to be gained by satisfactory performance (Vroom, 1964); (3) an affective component, chosen by Pintrich and De Groot (1990) to be test anxiety, based on the findings reported by Wigfield and Eccles (1989). Pintrich (1988, 1989) further sees the value component as being primarily metacognitive in that it is primarily defined as strategies for effort management. If one were

to further subdivide the so-called value component into two, namely: the incentive value of successful peformance, and strategies employed for the management of effort (e.g., goal-setting, planning), then the model expands to four dimensions.

Pintrich and De Groot (1990) have shown a relationship between all four components (attitude, metacognition, value, and affect) and the performance of seventh graders on classroom tests and subsequent grades. The purpose of the present research was (1) to see if the contribution of the four components to classroom academic performance generalized to college students, particularly on performance measures occurring in sequence over time; (2) to see if the components related to a measure of voluntary homework performance that had inherent incentive value in that it contributed grade bonuses; and (3) to see if performance on the voluntary homework task would be higher when the incentive value of the task became higher, thereby supporting incentive value as an independent component of motivation.

The first purpose, to replicate the Pintrich and De Groot (1990) findings at a different educational level, was considered valuable in testing the applicability and generality of the motivational model. This part of the study made it possible to extend the Pintrich and De Groot findings to a different student population than the original one, namely college students, and to sequential task performance. The importance of sequential task performance is based on the finding by Sexton and Tuckman (1990) and Sexton, Tuckman, and Crehan (1992) that while motivational variables tend to predict early task performance, later performances are far better predicted by earlier performances than by any other predictor variables. Hence, after one gains some real information about how to do something, real performance becomes a better predictor of subsequent performance than any preconceived mental judgements or strategies.

The second purpose was to extend the Pintrich and De Groot (1990) findings to a voluntary task considered by Tuckman and Sexton (1991) to be a better reflection of self-regulation than classroom academic test results. By completing a repetitive, relatively simple task, students must draw upon their own motivation and self-beliefs (Tuckman and Sexton, 1990).

The third purpose was to experimentally manipulate the incentive value of the self-regulation task to determine its effect on task performance. This would provide relevant results on other than self-report measures (as used by Pintrich and De Groot, 1990), as well as providing additional information on the motivational contribution of the task's incentive value independent of the cognitive strategies employed to manage self-regulation.

EXPERIMENT I

Method

Subjects. The sample included 62 college students in their junior and senior years (ages 19-22) who were preparing to become teachers, and were enrolled in a required Educational Psychology course. There were 43 females and 19 males, all but three of whom were White.

Motivation Measures. At the start of the semester, the students responded to the 56-item *Motivated Strategies for Learning Questionnaire* (MSLQ) put together by Pintrich and De Groot (1990). Responses were made on a 7-point Likert Scale (1=*not at all true of me* to 7=*very true of me*). The instrument measured the five following variables: (1) general self-efficacy (alpha=.89; 9 items regarding perceived competence in performance of classwork; e.g., *I think I will receive a good grade in this class*); (2) intrinsic value (alpha=.87; 9 items regarding interest in and perceived importance of coursework; e.g., *It is important for me to learn what is being taught in this class*); (3) test anxiety (alpha=.75; 4

items regarding worry provoked by tests; e.g., *I have an uneasy, upset feeling when I take a test*); (4) cognitive strategy (alpha=.83; 13 items regarding the use of metacognitive study strategies; e.g., *When studying, I copy my notes over to help me remember material*); (5) self-regulation (alpha=.74; 9 items regarding effort management; e.g., *Even when study materials are dull and uninteresting, I keep working until I finish*).

At the same time, students completed a short questionnaire measuring (on 9-point scales) (1) self-efficacy for item writing: how capable they felt of writing test items (the voluntary homework task described below), and how certain they were of this judgment; (2) self-efficacy for grade: what grade they expected to get in the course, and how certain they were of this judgment; (3) grade importance: how important it was for them to get a high grade in the course. On the first two, self-efficacy judgments were multiplied by certainty judgments to get actual scores.

Ability Measures. As a State requirement for advancement to Upper Division status, all students had completed within the past two years the *College Level Advanced Standing Test* (CLAST). This test yields scores in Reading and in Mathematics. The validity and reliability of this test has been well established, given its long-standing and widespread use.

Performance Measures. Students completed four achievement tests during the semester, each marking the end of one quarter of the course and testing the material covered in that quarter. Each test contained 50 multiple-choice items based on material in the lectures and textbook. The first two tests covered test construction, evaluation, and interpretation; the last two covered learning theories and their application. Reliabilities on the four tests ranged from .81 to .87. (Course grades were based on the average of the four tests, adjusted for any bonus earned for voluntary homework.)

Voluntary Homework System was a procedure by which students could earn grade bonuses on each test by writing test items covering the material to be on that test (Tuckman and Sexton, 1990). Students were permitted to submit up to 25 items per week with multiple-choice items being worth twice as much, and comprehension items three times as much, as completion items. Grade bonuses based on points earned by writing items were added directly to test scores (1% for each 25 points). VHS began after Test 1, and so there were three VHS segments: one before each of Test 2, Test 3, and Test 4. For purposes of this study, VHS total points across the three segments was used as a final performance measure.

Results

Zero-order correlations were run between all of the variables (see Tables 1 and 2). In addition, a factor analysis was run on the correlation matrix with the best fit provided for by an oblique rotation (see Table 3). Three major factors were extracted with Eigenvalues of 3.66, 1.80, and 1.15 respectively, accounting for 21, 12, and 8 percent of the variance.

The three measures of self-efficacy: SE for item-writing, SE for grade, and general SE were all related to one another and to the measures of both self-regulation and intrinsic value. These variables all loaded on Factor 3, which could be called the attitude or **self factor**. Intrinsic value and test anxiety were also related to one another. None of the motivational measures were related to the measure of cognitive strategy or to the measure of grade importance.

Insert Tables 1, 2, and 3 about here

As regards the interrelationships among the performance measures, scores on the four achievement tests were highly correlated with one another (r's ranged from .33 to .65 with an average of .44; $p<.001$). However, only Tests 2, 3, and 4 loaded on the same factor (Factor 1). In addition, scores on the ability measures - particularly in Reading - were positively correlated with achievement test performance, negatively correlated with VHS points earned, and unrelated to all of the motivational measures. The ability measures loaded on Factor 1 along with three of the four test scores and cognitive strategy. This could be called the **ability/achievement factor**.

Scores on Test 1 loaded on Factor 2 along with VHS bonus points (they correlated -.43; $p<.001$). VHS points did not correlate significantly with scores on the other three achievement tests. VHS points correlated with only one motivational measure, grade importance. However, also loading with it, Test 1 scores, and grade importance on Factor 2 was test anxiety. This can be called the **incentive factor**.

Of the four achievement tests, Test 1 correlated with the most motivational measures (six out of eight), while the other three achievement tests that followed it correlated with one, three, and three of the eight motivational measures respectively.

Of the motivational measures, self regulation and grade importance each correlated with the most performance measures (three out of five), while cognitive strategy correlated with one (barely) and intrinsic value with none. Two of the self-efficacy measures each correlated with two of the achievement test scores.

Hence, the results showed that the prime motivation associated with VHS points was grade importance, test anxiety, and score on Test 1. Achievement test scores, in general, were positively associated with self regulation and self-efficacy, and negatively associated with test anxiety and grade importance. Moreover, intrinsic value and cognitive strategy

had little or no association with performance. Also, the overlap of motivational and performance measures was greatest for the first achievement test and weakened thereafter.

EXPERIMENT II

Method

Subjects. In addition to the 62 students who participated in Experiment I, a second class of 63 students participated in this experiment. This second group of 63 were also in the 19-22 age range and had approximately the same proportion by gender and by race as did the first group. They were taking the same course from the same instructor. They did not differ significantly from the first group on either CLAST scores (Reading and Mathematics) or on self-efficacy for grade or for item writing, both of which were measured on the first day of class. Although the two classes to be compared in Experiment II were intact, they were considered to be equivalent. The selected procedure was considered to be only a slight limitation, given the parameters inherent in conducting experiments in ecologically-valid classroom contexts. Hence, Experiment II was a quasi-experiment (Tuckman, 1988).

Treatments. Each of the two classes experienced the Voluntary Homework System under a different set of conditions in order to vary the link between achievement test scores and the incentive value of writing VHS items. In the first condition, called *segmentized*, already described in Experiment I, VHS was subdivided into three segments, each of which provided its own bonus independent of the other segments, and each of which was both preceded and followed by an achievement test. In the second condition, called *unitized*, VHS was a single 10-week unit with one achievement test ocurring in week 4 and a second at the end of the 10 weeks. There was a single bonus opportunity for a total letter grade,

two-thirds of a letter grade, or one-third of a letter grade, depending upon the number of points amassed over the 10 weeks, which was added to the final course grade.

Measures. The dependent variable was total VHS points. In addition, self-efficacy for item-writing was assessed during the first class (as already described in Experiment I). However, for this experiment, students were classified as high, middle, and low on this measure. VHS points were analyzed by means of a 2 x 3 ANOVA with unitized versus segmentized condition as the independent variable and self-efficacy level the moderator variable.

Results

The F-ratio for condition was a highly significant 5.47 (df=1, 119; p=.02). Neither of the other two effects were significant (SE Level main effect =1.67; interaction =0.48). Accounting for the significant main effect of condition was the fact that students in the unitized or single unit condition earned an average of 256 points while those in the segmentized condition earned an average of 178 points.

DISCUSSION

The results of this study suggest that academic performance is a function of three factors: (1) an *intellectual* one that includes ability and prior achievement test performance, (2) one that includes both incentive value and anxiety - and may perhaps be called an *emotional* factor, and (3) a factor that includes self-efficacy, self regulation and intrinsic value - and may be called an *attitude* factor.

This structure differs somewhat from that suggested by Pintrich (1988, 1989) in that the metacognitive aspect is relatively absent (it made only a slight contribution to the intellectual factor). Another difference from the Pintrich and De Groot (1990) findings is the greater impact in the current study of incentive or payoff value on the motivation to perform

the task. The self-reported importance of getting a high grade in combination with a) actually getting a low grade on the first test, and b) high performance on the Voluntary Homework System aimed at getting a grade bonus formed the bulk of the second or emotional factor in the current study. This factor also included test anxiety. In Pintrich and De Groot's (1990) findings, the emotional factor was represented exclusively by test anxiety.

The importance of incentive or payoff value to motivation was further supported by the results of the second part of the current study where students who were less sure of their final grade showed a greater inclination to perform extra work for a grade bonus than those who were more certain of their grade. It appeared that this behavioral manifestation of motivation (called self-regulated performance by Tuckman and Sexton, 1990) was prompted in large part by the need for the payoff, and hence its incentive value. Students in the segmentized or four-test condition had less to gain from the potential grade bonus than those in the unitized or two-test condition and so wrote fewer test items.

The results of this study also showed a change in the predictive value of motivational variables on academic performance over time. Of the eight motivational variables, six were significantly related to performance on Test 1, while only three of eight were significantly related to performance on Test 4. As has been previously shown (Sexton and Tuckman, 1990), past performance on the same task becomes the best predictor of subsequent performance over time.

A comparison of the results of this study with those of Pintrich and De Groot (1990) shows both similarities and differences, with the similarities outweighing the differences despite the fact that the earlier study was done with seventh graders and this one with college students. The major difference, that being the contribution of incentive value, may

well reflect the greater salience of grades in the college environment than in the middle school. Clearly, some of the variables that explain motivation are likely to be situational, and hence change from setting to setting. Incentive value would seem to be such a variable.

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Table 1

Zero-Order Correlations Between Motivational Variables

Variable	1	2	3	4	5	6	7
1.Genr. Self-Efficacy	---						
2.Self-Efficacy/Items	.43***	---					
3.Self-Efficacy/Grade	.61***	.54***	---				
4.Cognitive Strategy	.07	.01	.12	---			
5.Self Regulation	.60***	.38**	.43***	.23	---		
6.Intrinsic Value	.48***	.21.	.38**	.1[illegible]	.52***	---	
7.Grade Importance	-.11	-.06	-.18	-.05	-.04	.20	---
8.Anxiety	-.13	-.21	-.12	-.16	-.09	.40**	.18

N=62; **p<01, ***p<.001

Table 2

Zero-Order Correlations Between Motivation and Ability Variables and Performance Results

Motivation/Ability Variable	Performance Results Test 1	Test 2	Test 3	Test 4	VHS Pts
Expectancy					
Genr. Self-Efficacy	.35**	.19	.30*	.16	-.09
Self-Efficacy/Items	.26*	-.02	.12	-.01	.09
Self-Efficacy/Grade	.53***	.01	.31*	.04	-.23
Metacognition					
Cognitive Strategy	.20	.21	.22	.25*	-.11
Self Regulation	.32**	.17	.50***	.50***	.19
Value					
Intrinsic Value	.11	.12	.18	.09	.08
Grade Importance	-.43***	-.07	-.19	-.34**	.34**
Emotion					
Anxiety	-.32**	-.31*	-.09	.01	.12
Ability					
CLAST-Rdg.	.34**	.29*	.25	.29*	-.31*
CLAST-Math	.29*	.42***	.21	.12	-.07

N=62; *p<.05; **p<.01; ***p<.001

Table 3

Factor Loadings of Variables

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3
Test 4	.86*	.14	.07
Test 3	.67*	-.00	-.17
Test 2	.53*	-.21	.05
CLAST-Rdg	.36*	-.23	.07
CLAST-Math	.31*	-.27	.12
Cog Strategy	.27*	-.04	-.06
Test 1	.24	-.65*	-.39
VHS Pts	.04	.58*	.01
Grade Importance	-.14	.45*	.02
Test Anxiety	-.04	.43*	.01
Self-Eff/Grade	-.17	-.33	-.86*
Genr Self-Eff	.11	-.07	-.72*
Self-Eff/Items	-.05	-.02	-.60*
Self Regulation	.53	.32	-.57*
Intrinsic Value	.17	.35	-.56*

*Highest factor loading